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Discards of Atlantic Cod, Haddock and Yellowtail Flounder from the 2007 Canadian Scallop Fishery on Georges Bank

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ABSTRACT

Discards of Atlantic cod, haddock and yellowtail flounder from the 2007 Canadian scallop fishery on Georges Bank were estimated from 14 observed trips. Data were insufficient to determine spatial differences in discard rates per hour but temporal trends were accounted using a 3-month moving window calculation. Discards were estimated by applying the monthly discard rate per hour obtained by the 3-month moving window calculation to the total monthly effort in hours of the scallop fleet. Total annual estimated discards in 2007 were highest for Atlantic cod, at 124 mt, intermediate for yellowtail flounder, at 105 mt, while those for haddock were lowest, at 61 mt.

RÉSUMÉ

Les rejets de morue, d'aiglefin et de limande à queue jaune dans la pêche canadienne du pétoncle sur le banc Georges en 2007 ont été estimés d'après les résultats de 14 sorties de pêche au cours desquelles un observateur était présent. Les données étaient insuffisantes pour cerner des différences spatiales dans les taux de rejets à l'heure, mais on a tenu compte des tendances temporelles en utilisant un calcul sur un créneau mobile de trois mois. Les rejets ont été estimés par application du taux mensuel de rejets à l'heure découlant du calcul effectué à l'aide du créneau mobile de trois mois à l'effort mensuel total de la flottille de pétoncliers. Parmi les rejets annuels totaux estimés pour 2007, ce sont les rejets de morue qui étaient les plus importants (124 tm), suivis de ceux de limande à queue jaune (105 tm) et en dernière place des rejets d'aiglefin (61 tm).

Introduction

Management measures established in 1996 prohibit the landing of groundfish (except monkfish) by the Canadian scallop fishery on Georges Bank. All incidental catch of Atlantic cod, haddock and yellowtail flounder in 2007 was therefore discarded. Discards, pre or post 1996, were not recorded in the scallop fishery statistics. Discards of Atlantic cod, haddock and yellowtail flounder from the Canadian scallop fishery for 1960-2004 were estimated by Van Eeckhaute et al. (2005) and updated for 2005 and 2006 (Gavaris et al, 2007). This analysis updates the Canadian scallop fishery discard estimate series for 2007.

Data and Methods

Prorating

Any incidental catch that is not landed, i.e., is not recorded in the fishery statistics records, is designated as "discards". Following Gavaris et al (2007), discards of Atlantic cod, haddock and yellowtail flounder in the scallop fishery on Georges Bank were estimated by applying monthly discard rates in kg/hour obtained from observed trips to the total monthly effort of the scallop fleet in hours.

discards = total scallop effort x *(observed discards / observed scallop effort)*

This approach is dependent on the assumption that the population density of the incidentally caught species experienced by observed trips, i.e. the (*observed discards / observed scallop effort*) ratio, is representative for the whole scallop fishery. Therefore, results can be sensitive to inadequate sampling of the spatial/temporal variation in the population density of the incidentally caught species.

Effort refers to hours towed, with usually 2 dredges being towed at the same time. As there is no adjustment for the number of dredges or size of dredges, it is assumed that the amount of gear used on observed trips is representative of the amount of gear used in typical operations. Effort information for observed trips may be obtained from observer records or from fishery statistics. Since the fleet effort must be obtained from fishery statistics, effort from fishery statistics was also used for the observed trips to ensure consistency.

The fishery statistics effort represents the hours fished for an entire observed trip. The observed discards are only for the portion of the fishing activity that was witnessed. It is therefore necessary to prorate the witnessed discards to the discards for the entire observed trip. The number of dredge hauls that are observed and the total number of dredge hauls that are made on the trip are recorded. The total discards for a trip are obtained by prorating the witnessed discards by the ratio of total number of dredges to observed number of dredges recorded for the trip.

Scallop fishing practice may result in intensive localized fishing activity. Observers on scallop trips have noted on occasion, that what appears to be the same fish may be caught more than once. Counting a fish more than once if it is captured multiple times may result in over-estimation of discards. A program for marking discarded fish using fin clipping was instituted in 2007 to prevent multiple counting of the same discards. A recapture rate was calculated as the ratio of the number of fin clipped fish that were recaptured to the total number of fin clipped fish that were released. The prorated trip discards were adjusted downwards using the recapture rate: *adjusted discards = discards/(1+recapture rate)*.

Effort Standardization

Prior to 2004, virtually none of the scallops landed were caught by freezer trawlers. The prevalence of freezer trawlers has increased rapidly in recent years with freezer trawler landings accounting for 34%, 57%, 63% and 67% in 2004 to 2007 respectively. Freezer trawlers operate differently and use somewhat larger dredges. The effective fishing intensity exerted by an hour of fishing by a freezer trawler may therefore not be equivalent to that of a wet fish trawler. The conversion factor of 1.2 for standardizing wet fish hours to freezer trawler hours derived by Gavaris et al. (2007) was applied to 2007 data.

Results and Discussion

Estimates of Atlantic cod, haddock and yellowtail flounder discards from the 2007 Canadian scallop fishery on Georges Bank were based on observed discards from 14 observed trips (Table 1). The effort for observed trips in 2007 comprised about 10% of total effort. The spatial coverage of observed trips in relation to the fishery is illustrated by quarter in Figure 1. Fishing locations for observed trips appear to be representative of the spatial distribution of fishing locations by the fleet in all quarters.

Both temporal and spatial patterns in discard rates might be expected, but there were not enough observed trips in 2007 to calculate discard rates by area, as unit area 5Zem had limited fishing and observer coverage. Seasonal patterns in discard rates were taken into account by applying calculations using a 3-month moving window. In 2007, the discard rates (kg/hr) for yellowtail flounder were higher during the spring and early summer and lower during winter, while for cod and haddock they were higher during the first half of year and lower during the second half (Figure 2). To estimate discards, the monthly discard rates were applied to the total monthly effort of the scallop fleet. Few fin clipped fish were recaptured (Table 2). Using the adjusted values gave annual estimated discards that were indistinguishable, to the nearest metric ton, for cod and haddock and only about one metric ton lower for yellowtail flounder. Monthly and annual cumulative estimated discards for 2007 are given in Table 3. Total annual estimated discards in 2007 were highest for Atlantic cod, at 124 mt, intermediate for yellowtail flounder, at 105 mt, while those for haddock were lowest, at 61 mt. In the absence of reliable survival estimates, all discarded Atlantic cod, haddock and yellowtail flounder are assumed dead for the purpose of stock assessment computations.

References

Gavaris S, Robert G, Van Eeckhaute L. 2006. Discards of Atlantic cod, haddock and yellowtail flounder from the 2005 and 2006 Canadian scallop fishery on Georges Bank. TRAC Reference Document 2007/03. 10p.

Van Eeckhaute L, Gavaris S and Stone HH. 2005. Estimation of cod, haddock and yellowtail flounder discards from the Canadian Georges Bank scallop fishery for 1960 to 2004. TRAC Reference Document 2005/02. 18p.

Table 1. Observed trips from the Canadian Georges Bank scallop fishery in 2007. The discards columns labeled 'Adj.' have been adjusted for recaptures based on the fin-clipping experiment.

			Proration			Discards (kg)									Effort (hrs)
			Dredges			Yellowtail Flounder			Cod			Haddock			
Trip ID	Board Date	Land Date	Obs.	Total	Prop.	Observed	Prorated	Adj.	Observed	Prorated	Adj.	Observed	Prorated	Adj.	
T2007-1	02/01/2007	11/01/2007	190	388	0.49	3	6	6	414	845	844	55	112	112	109
T2007-2	15/02/2007	02/03/2007	287	556	0.52	7	14	13	1251	2424	2419	303	587	583	136
T2007-3	15/03/2007	02/04/2007	266	516	0.52	122	237	232	495	960	958	157	305	303	89
T2007-4	27/03/2007	17/04/2007	466	954	0.49	1628	3333	3274	1685	3450	3443	736	1507	1497	177
T2007-5	01/05/2007	10/05/2007	145	255	0.57	174	302	302	94	165	165	28	49	49	44
T2007-6	14/06/2007	29/06/2007	389	751	0.52	97	182	182	120	232	232	57	110	110	91
T2007-7	11/07/2007	03/08/2007	657	1176	0.56	1185	2083	2083	493	880	880	1057	1881	1881	223
T2007-8	23/07/2007	31/07/2007	140	226	0.62	28	44	44	12	19	19	5	8	8	38
T2007-9	06/08/2007	21/08/2007	554	1080	0.51	67	131	131	18	35	35	20	39	39	180
T2007-10	10/08/2007	25/08/2007	492	1002	0.49	186	373	373	71	145	145	44	84	84	194
T2007-11	28/08/2007	06/09/2007	316	504	0.63	627	982	982	201	320	320	137	217	217	149
T2007-12	21/09/2007	30/09/2007	202	374	0.54	33	60	60	93	172	172	45	83	83	115
T2007-13	09/10/2007	18/10/2007	204	400	0.51	5	10	10	17	33	33	11	22	22	115
T2007-14	11/10/2007	18/10/2007	198	408	0.49	44	91	89	32	66	66	56	115	115	65

Table 2. Recapture rates for fin-clipped fish from observed Canadian scallop fishery trips on Georges Bank for 2007.

	Yellowtail			Cod			Haddock		
Trip ID	Clipped	Recaptured	Recapture rate	Clipped	Recaptured	Recapture rate	Clipped	Recaptured	Recapture rate
T2007-1									
T2007-2									
T2007-3									
T2007-4									
T2007-5	344	5	0.015						
T2007-6	396	12	0.030	103	0	0.000	66	0	0.000
T2007-7	2937	53	0.018	304	1	0.003	1075	6	0.006
T2007-8	0	0	NA	0	0	NA	0	0	NA
T2007-9	119	0	0.000	10	0	0.000	17	0	0.000
T2007-10	386	6	0.016	29	0	0.000	33	2	0.061
T2007-11	0	0	NA	0	0	NA	0	0	NA
T2007-12	61	1	0.016	55	0	0.000	47	0	0.000
T2007-13	11	0	0.000	7	0	0.000	12	0	0.000
T2007-14	0	0	NA	0	0	NA	0	0	NA
Totals	4254	77	0.018	508	1	0.002	1250	8	0.006

Table 3. Discards from the Canadian scallop fishery on Georges Bank for 2007 calculated using a 3 month moving window discard rate.

	Discard Rate (kg/hour)			Effort	Discard (mt)			Cum Annual Discard (mt)		
2007	Yellowtail	Cod	Haddock		Yellowtail	Cod	Haddock	Yellowtail	Cod	Haddock
Jan	0.080	13.343	2.854	1030	0	14	3	0	14	3
Feb	0.768	12.662	3.006	1046	1	13	3	1	27	6
Mar	8.913	16.998	5.966	742	7	13	4	7	40	11
Apr	12.471	14.739	5.994	2105	26	31	13	34	71	23
May	12.216	12.313	5.333	3122	38	38	17	72	109	40
Jun	6.581	3.266	5.163	1252	[illegible]	4	6	80	113	46
Jul	3.873	1.804	2.923	2257	[illegible]	4	7	89	117	53
Aug	4.085	1.746	2.572	2560	10	4	7	99	122	59
Sep	1.960	0.905	0.620	1850	4	2	1	103	123	61
Oct	2.616	1.333	0.988	654	2	1	1	105	124	61
Nov				0				105	124	61
Dec				0				**105**	**124**	**61**

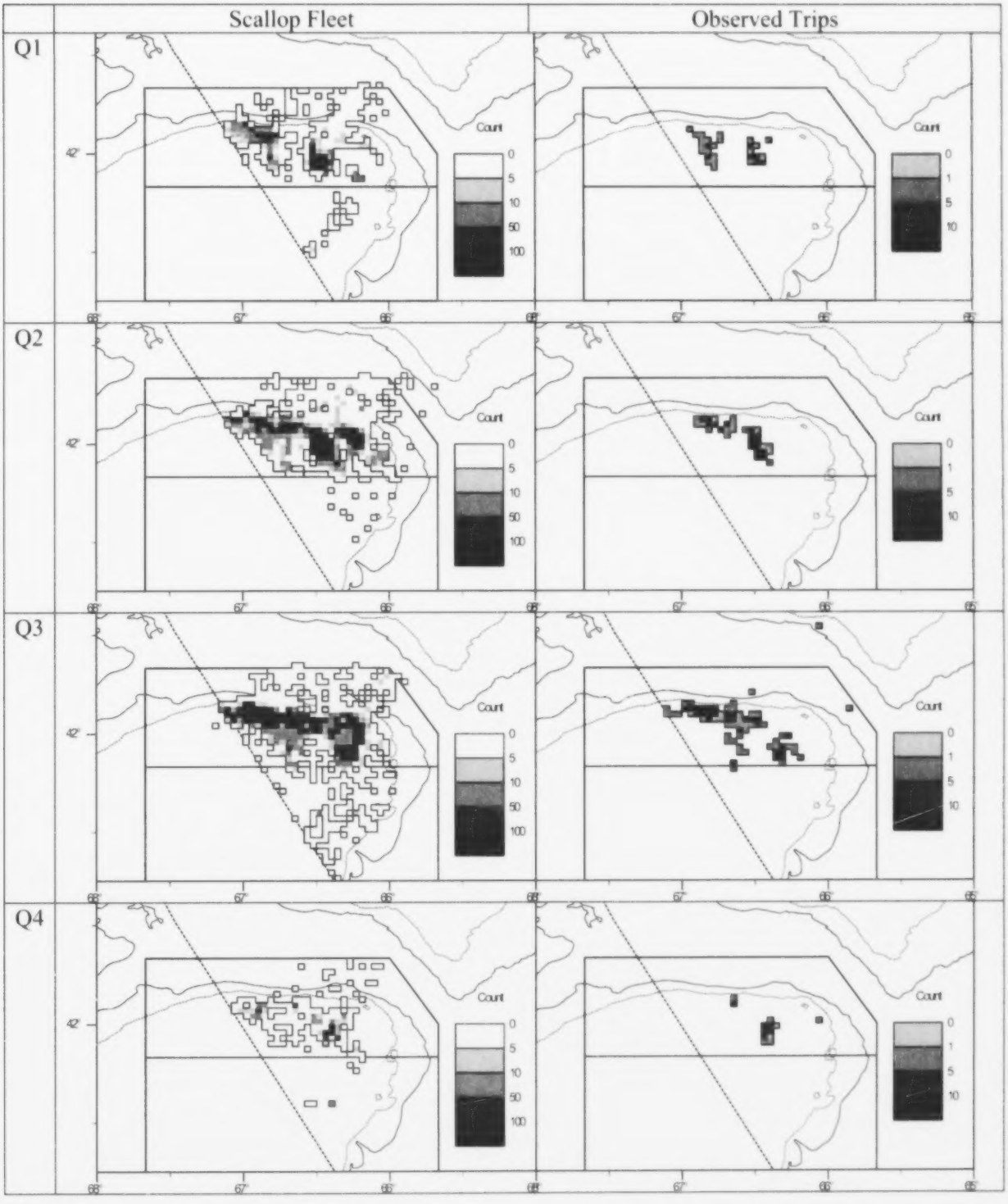

Figure 1. Fleet fishing locations based on count of VMS polls (left panels) compared to locations of observed fishing based on count of dredges (right panels) for the 2007 Canadian scallop fishery on Georges Bank.

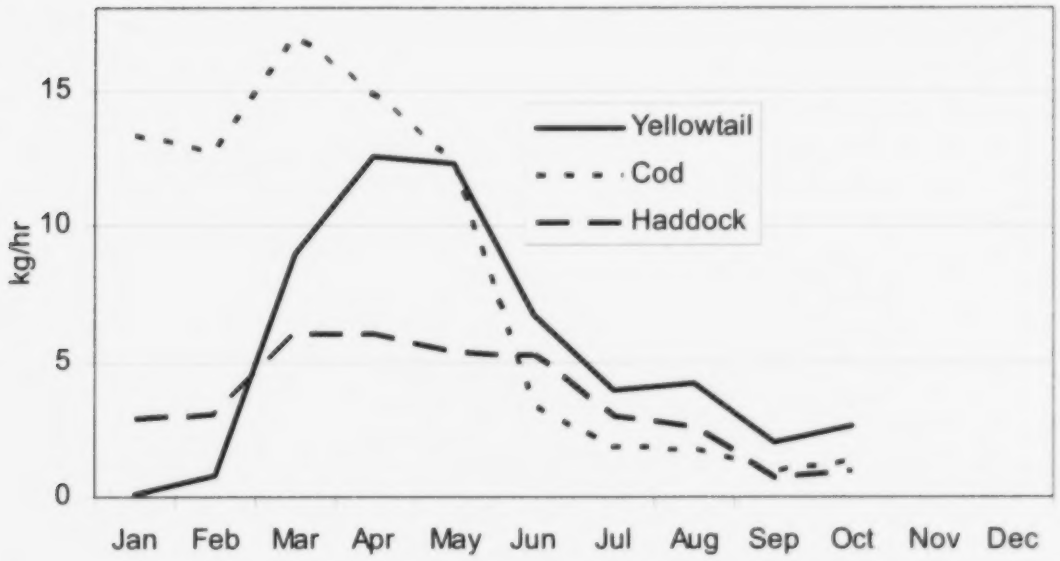

Figure 2. Seasonal patterns in discard rates of yellowtail flounder, Atlantic cod and haddock from the Canadian scallop fishery on Georges Bank in 2007 calculated using a 3-month moving window.